

CLAIMS

What is claimed is:

1           1.    An integrated circuit having an on chip power  
2   supply coupled to a field effect transistor having a source,  
3   a drain and a gate, the power supply comprising:  
4           a charge storage device and a current directing device;  
5           a first terminal of the charge storage device being  
6   connected to the source of the field effect transistor, a  
7   second terminal of the charge storage device being connected  
8   to a cathode of the current directing device, and an anode of  
9   the current directing device being connected to the drain of  
10   the transistor.

1           2.    The circuit of claim 1 wherein the charge storage  
2   device is a capacitor.

1           3.    The circuit of claim 1 wherein the current  
2   directing device is a diode.

1           4.    The circuit of claim 1 wherein a voltage between  
2   the first and second terminals of the charge storage device  
3   is used to power a control circuit.

1           5.    The circuit of claim 4 wherein the control circuit  
2   is used to drive the gate of the transistor.

1        6.    The circuit of claim 5 wherein a body of the field  
2 effect transistor is connected to the drain, and wherein the  
3 control circuit is responsive to the polarity of the voltage  
4 between the source and the drain to turn the field effect  
5 transistor on and off.

1        7.    The circuit of claim 5 wherein a body of the field  
2 effect transistor is connected to the source, and wherein the  
3 control circuit is responsive to a gate control signal to  
4 turn the field effect transistor on and off.

1        8.    The circuit of claim 7 wherein the circuit is  
2 packaged as a three terminal device.

1        9.    The circuit of claim 1 wherein the field effect  
2 transistor is an n-channel MOSFET.

1        10.   The circuit of claim 1 wherein the field effect  
2 transistor is a p-channel MOSFET.

1        11.   The circuit of claim 1 wherein the field effect  
2 transistor is an n-channel JFET.

1        12.   The circuit of claim 1 wherein the field effect  
2 transistor is a p-channel JFET.

1        13. The circuit of claim 1 wherein the field effect  
2 transistor functions as a rectifying diode.

1        14. An integrated circuit comprising:  
2        a capacitor;  
3        a diode;  
4        a field effect transistor having first and second  
5 terminals and a control terminal;  
6        the capacitor and the diode being connected in series  
7 between the first and second terminals of the transistor;  
8        a control circuit coupled to the capacitor and to the  
9 control terminal;  
10       the charge in the capacitor being used to power the  
11 control circuit controlling the voltage on the control  
12 terminal of the transistor.

1        15. The circuit of claim 14 wherein the control circuit  
2 is responsive to the voltage between the first and second  
3 terminals of the transistor.

1        16. The circuit of claim 15 wherein the control circuit  
2 is configured to control the voltage on the control terminal  
3 to turn on the transistor when the voltage between the first  
4 terminal and the second terminal is of a first polarity and  
5 to turn off the transistor when the voltage between the first

6 terminal and the second terminal is of a second polarity  
7 opposite the first polarity, the current directing device  
8 being conductive when the voltage between the first terminal  
9 and the second terminal is of the second polarity.

1 17. The circuit of claim 16 wherein the first terminal  
2 is a source, the second terminal is a drain and the control  
3 terminal is a gate, the gate being connected to the control  
4 circuit.

1 18. The circuit of claim 17 wherein the circuit is  
2 packaged as a two terminal device.

1 19. The circuit of claim 14 wherein the control circuit  
2 is responsive to a control signal provided thereto.

1 20. The circuit of claim 19 wherein the circuit is  
2 packaged as a three terminal device.

1 21. The circuit of claim 19 wherein the control circuit  
2 is configured to control the voltage on the control terminal  
3 responsive to the control signal to provide enhanced turn on  
4 of the transistor responsive to a transistor turn-on control  
5 signal.

1        22. The circuit of claim 21 wherein the current  
2 directing device is oriented to provide charging current to  
3 the charge storage device when the transistor is turned off.

1        23. The circuit of claim 14 wherein the transistor is a  
2 FET.

1        24. The circuit of claim 14 wherein the FET is an  
2 n-channel MOSFET.

1        25. The circuit of claim 14 wherein the FET is a  
2 p-channel MOSFET.

1        26. The circuit of claim 14 wherein the FET is an  
2 n-channel JFET.

1        27. The circuit of claim 14 wherein the FET is a  
2 p-channel JFET.

1        28. The circuit of claim 14 wherein the field effect  
2 transistor functions as a rectifying diode.

1        29. A circuit comprising:  
2 an integrated circuit including a charge storage device,  
3 a current directing device, a field effect transistor having  
4 a body, a source, a drain and a gate, and a control circuit,  
5 the charge storage device and the current directing device

6 being connected in series between the source and drain  
7 terminals of the transistor, a charge on the charge storage  
8 device being coupled to and acting as the power supply for  
9 the control circuit, the control circuit having an output  
10 coupled to the gate of the field effect transistor, the  
11 control circuit turning the transistor on when the voltage  
12 between the source and drain is of a first polarity, and off  
13 when the voltage between the source and drain is of a second  
14 polarity, the current directing device having a polarity to  
15 charge the charge storage device when the voltage between the  
16 source and drain is of a second polarity.

1 30. The circuit of claim 29 wherein the charge storage  
2 device is a capacitor.

1 31. The circuit of claim 30 wherein the current  
2 directing device is a diode.

1 32. The circuit of claim 29 wherein the field effect  
2 transistor is an integrated circuit diode having its gate  
3 connected to the control circuit.

1 33. The circuit of claim 29 wherein the circuit is  
2 packaged as a two terminal device.

1 34. The circuit of claim 29 wherein the transistor is a  
2 FET.

1           35. The circuit of claim 29 wherein the FET is an  
2 n-channel MOSFET.

1           36. The circuit of claim 29 wherein the FET is a  
2 p-channel MOSFET.

1           37. The circuit of claim 29 wherein the FET is an  
2 n-channel JFET.

1           38. The circuit of claim 29 wherein the FET is a  
2 p-channel JFET.

1           39. A circuit comprising:  
2 an integrated circuit including:  
3 a capacitor;  
4 a diode;  
5 an n-channel field effect transistor having a source, a  
6 drain, a gate and a body connected to the drain; and,  
7 a control circuit;  
8 the capacitor and the diode being connected in series  
9 between the source and drain with the diode being conductive  
10 to charge the capacitor when the source is at a higher  
11 voltage than the drain, the capacitor being coupled to and  
12 acting as the power supply for the control circuit, the  
13 control circuit having an output coupled to the gate of the  
14 field effect transistor, the control circuit turning the

15 transistor on when the voltage on the drain is higher than  
16 the voltage on the source, and off when the voltage on the  
17 source is higher than the voltage on the drain.

1 40. The circuit of claim 39 wherein the field effect  
2 transistor has a channel that is conductive when the source  
3 and gate are at the same voltage.

1 41. The circuit of claim 39 wherein the circuit is  
2 packaged as a two terminal device.

1 42. A circuit comprising:  
2 an integrated circuit including:  
3 a capacitor;  
4 a diode;  
5 a field effect transistor having a source, a drain, a  
6 gate and a body connected to the source; and,  
7 a control circuit;  
8 the capacitor and the diode being connected in series  
9 between the source and drain with the diode being conductive  
10 to charge the capacitor when the transistor is turned off,  
11 the capacitor being coupled to and acting as the power supply  
12 for the control circuit, the control circuit having a gate  
13 control input and providing an output coupled to the gate of  
14 the field effect transistor to provide an enhanced gate



15 control signal to the field effect transistor responsive to  
16 the gate control input.

1 43. The circuit of claim 42 wherein the field effect  
2 transistor is an n-channel MOSFET.

1 44. The circuit of claim 42 wherein the field effect  
2 transistor is a p-channel MOSFET.

1 45. The circuit of claim 42 wherein the field effect  
2 transistor is an n-channel JFET.

1 46. The circuit of claim 42 wherein the field effect  
2 transistor is a p-channel JFET.

1 47. The circuit of claim 42 wherein the circuit is  
2 packaged as a three terminal device.